2. PRESS/ROTARY SECTION

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2. Press/Rotation Section

[Theory of Operation]

1. Drum Rotation Control System

- Rotation of Main Pulley

The Main motor provides the drive for the rotation of the Main pulley via the Cam pulley and Main belt.

- Rotation of Drum

The Main pulley is attached on the Main shaft, which is engaged with the Main shaft catch of the Drum. While the Main motor is operating, the Drum is rotating, driven by the Main shaft.

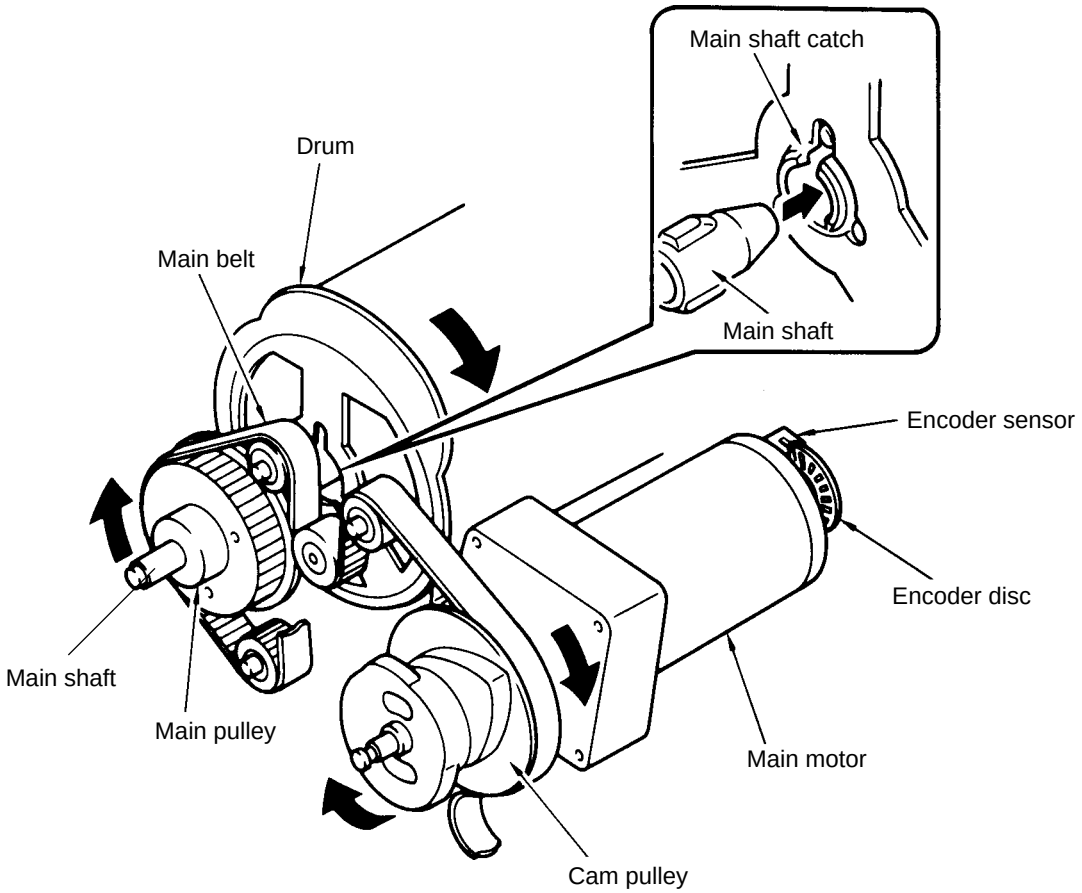
- Control of Rotation Speed

The Main motor speed is controlled by the Encoder disc and sensor, attached at the top of the Main motor.

The Encoder sensor counts the number of slits on the Encoder disc that have passed the sensor in given period and controls actual drum rotation speed.

- Home-positioning of Drum

When the Front cover is opened and the Drum home position button (indicator) is pressed, the Main motor operates until the light path of Position A sensor is blocked by Plate A , to rotate the Drum up to the home position where the Drum can be pulled out of the machine.



2. Press System

- Conversion of Rotation to Up-and-Down Motion via Pressure Cam

The Pressure cam, attached to the Main pulley, continuously rotates clockwise via the Main belt, which drives the Main pulley, when the Main motor rotates.
The rotation of the Pressure cam provides the drive for the Linking plate.
As the cam follower of the Linking plate contacts the Pressure cam, the high and low points of the cam convert the rotation movement of the cam to an up-and-down motion of the Linking plate.

- The Up-and-Down Motion of Pressure Hook

The up-and-down motion of the Linking plate is conveyed to the Pressure hook through the Pressure links. The Pressure hook moves up and down with the Pressure shaft as the fulcrum.

- Operation of Pressure Solenoid

The Pressure solenoid, attached to the Pressure hook and Hook lever assembly, functions to engage the Hook lever assembly with the Pressure lever.

- Control of Pressure Solenoid

The Pressure solenoid is activated ON when paper is detected by the Paper sensor while the Print signal is output (ON). When the Pressure solenoid is activated ON, the Hook lever assembly is engaged with the Pressure lever.

[Note]

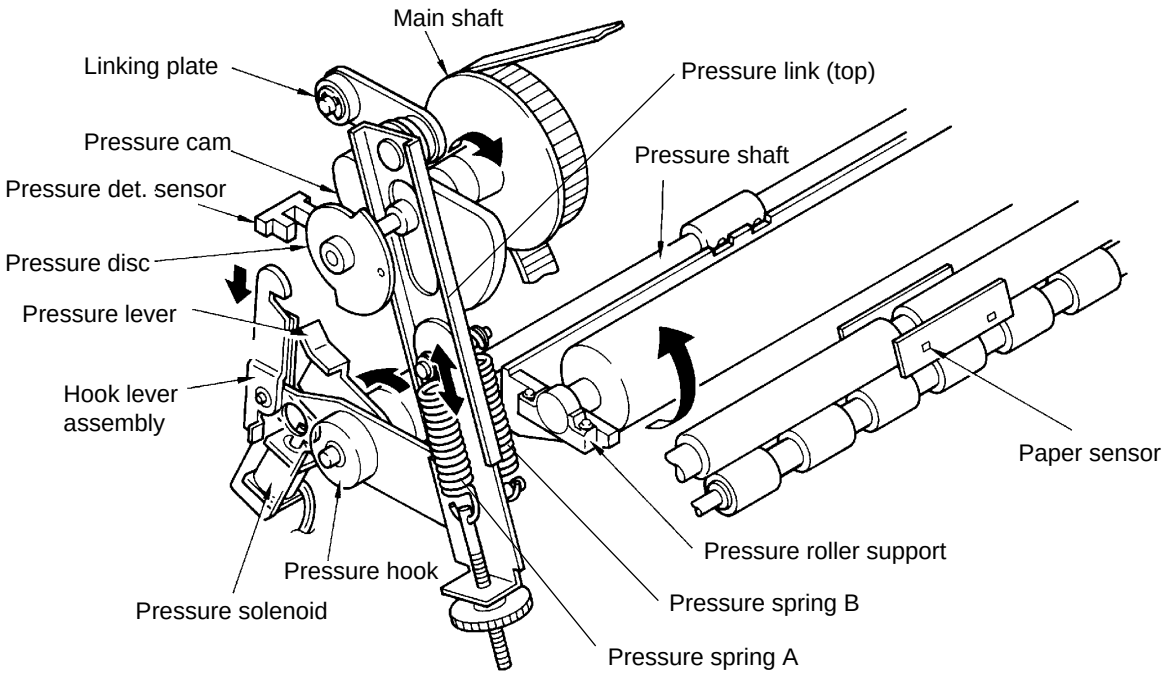
The Pressure solenoid is deactivated when the light path of the Pressure detection sensor is opened during the rotation of the Pressure disc.

- Lifting of Pressure Roller

While the Hook lever assembly is engaged with the Pressure lever, the Pressure lever is pulled down by the descending Hook lever, turning the Pressure shaft counter-clockwise because the Pressure lever is attached on the Pressure shaft.
The Pressure shaft is attached to the Pressure roller support on which the Pressure roller is placed. Therefore, when the Pressure shaft rotates counter-clockwise, the Pressure roller is lifted up to the Drum, pressing a sheet of paper against the Drum.

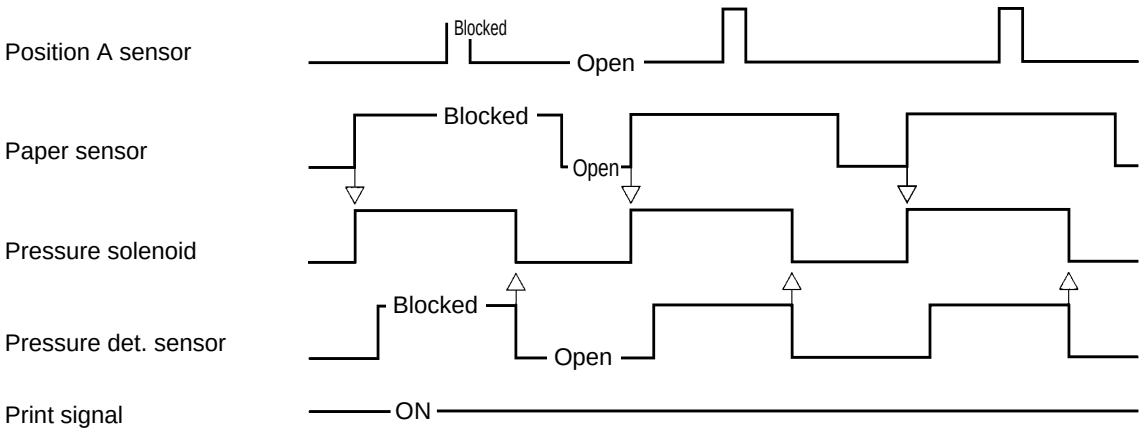
- Function of Pressure Links

While the Pressure roller is in contact with the Drum, the Pressure link (top) is raised by the Pressure cam, pulling the Pressure springs A and B to apply pressure to the Drum and transfer ink from the Drum onto a sheet of paper.



- Timing Chart -

Press System



3. Pressure Regulation System

- Basic

The printing density is changed by turning ON the Pressure control motor.
The Pressure control motor changes the printing pressure by controlling the length of the Pressure springs.
The printing pressure, broken down into 12 levels, is determined by the print density setting, print speed setting and the temperature of ink (inside the drum).
The Pressure control sensor keeps track of the initial pressure position (home position).

- Pressure Regulation System

The pressure control motor rotates up or down to a specified position.
This motion is conveyed to the Print pressure adjustment screw via the Print pressure adjustment gear, changing the tension (pull power) of the Pressure spring, which changes the print pressure.
An encoder sensor, attached on top of the Pressure control motor, counts the number of rotation the motor has made. (One motor rotation is converted into 5 pulse counts.)

- Initial Pressure Position (home position) -- Pressure Level No.7

The machine looks for the initial pressure position each time the main power is turned ON or All Reset button is pressed.
In this case, the Pressure control motor operates depending on the condition of the Pressure control sensor, as described below.

- **If the light path of the Pressure control sensor is open ;**
  The Pressure control motor rotates until the light path is blocked by Bracket B, then rotates in the reverse direction until the light path is opened again.
- **If the light path of the pressure control sensor is blocked by Bracket B:**
  The Pressure control motor rotates until the light path of the sensor is opened.

The initial (home) pressure position of the printing pressure is Level No.7
Once the initial pressure position is achieved, the Pressure control motor rotates until the pressure level is adjusted to the equivalent of Print speed No.1. The printing starts from the low speed and is increased, changing the pressure at the same time, until a selected speed is achieved.

- At Speed-change Mode

When the Print speed button on the operation panel is pressed to change the printing speed, the pressure is increased as the speed is increased to keep the print density constant.

[Note] If the Print speed button is pressed while the machine is in idle, the Pressure control motor does not rotate until printing starts.

- At Density-change Mode (Not available for RA4200)

When the Print density button on the operation panel is pressed to change the print density, the pressure is increased as the density is increased.

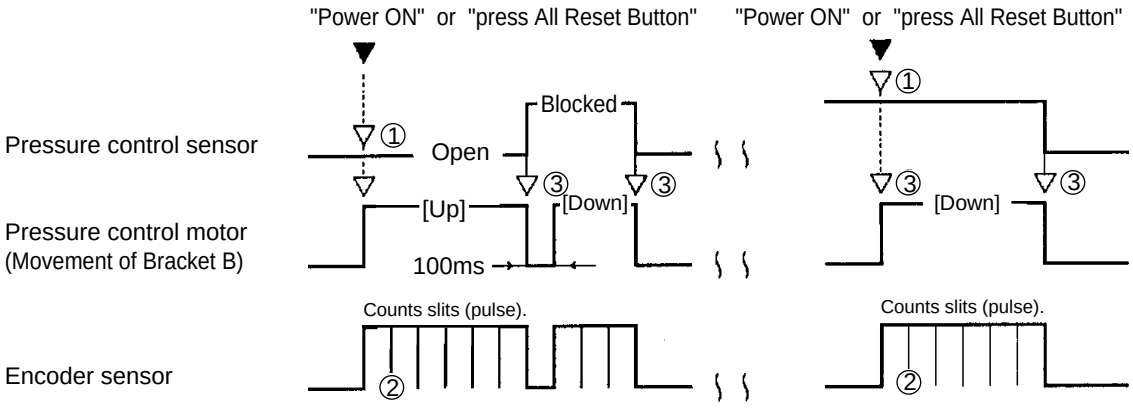
[Note] If the Print density button is pressed while the machine is in idle, the Pressure control motor does not rotate until printing starts.

In-drum Temperature \ Print Speed Setting <Print Density>			1 (1st print)	2	3	4	5
~7.5°C	(~46°F)	<~B1>	Level 8	Level 9	Level 10	Level 11	Level 12
7.5~15.0°C	(46~59°F)	<B0~9C>	Level 6	Level 7	Level 8	Level 9	Level 10
15.0~22.5°C	(59~73°F)	<9B~86>	Level 4	Level 5	Level 6	Level 7	Level 8
22.5~30.0°C	(73~86°F)	<85~72>	Level 2	Level 3	Level 4	Level 5	Level 6
30.0°C~	(86°F~)	<71~>	Level 1	Level 2	Level 3	Level 4	Level 5

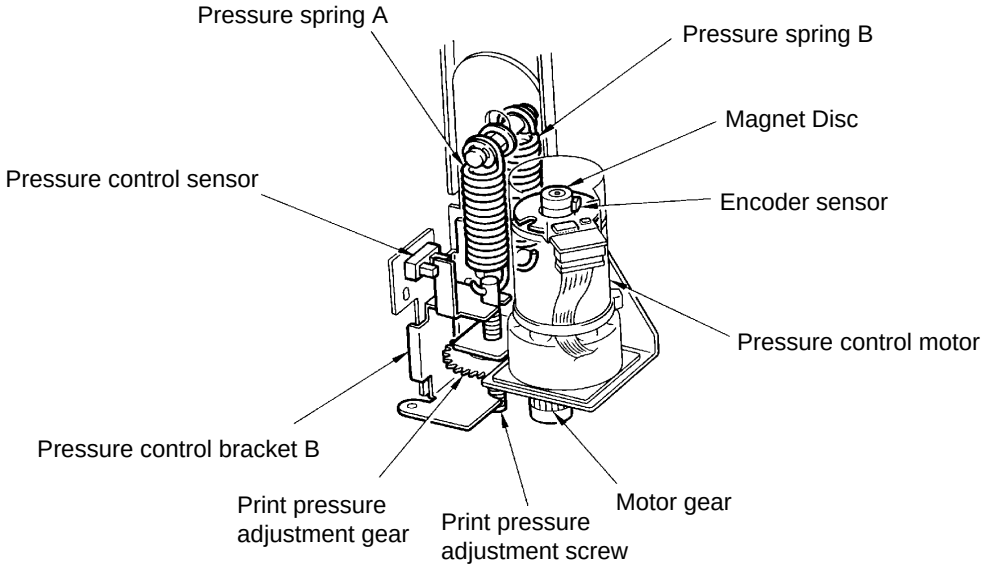
* "Level 1" corresponds to the lowest print pressure and "Level 12" the highest.
* The hexadecimal number in "< >" indicates a digital display of temperature in the drum which is displayed on the operation panel in Test mode No.115.

- Timing Chart -

Pressure Regulation System (Initial Movement)



① When the power is turned ON or All reset button is pressed, the light path of the Pressure control sensor is checked.
② If no pulse is transmitted from the Encoder sensor within **100ms** after the Pressure control motor is turned ON, the machine assumes a Pressure control motor lock has occured and indicates the error code **[E 11]**.
③ If light path of the Pressure control sensor is not "blocked" or "opened" within **5 seconds** after the Pressure control motor is turned ON, the machine assumes a Pressure control motor lock has occured and indicates the error code **[E 11]**.



4. Pressure Regulation System <GR>

- Basic

The printing density is changed by turning the Pressure control motor to ON.
The Pressure control motor changes the printing pressure by controlling the length of the Pressure springs.
The printing pressure, broken down into 10 levels, is determined by the print density setting, print speed setting and the temperature of ink (inside the drum).
The Pressure control sensor keeps track of the initial pressure position (home position).

- Pressure Regulation System

The pressure control motor rotates up or down to a specified position.
This motion is conveyed to the Print pressure adjustment screw via the Print pressure adjustment gear, changing the tension (pull power) of the Pressure spring, which changes the print pressure.
An encoder sensor is attached on top of the Pressure control motor to count the number of rotations the motor has made. (One motor rotation is converted into 5 pulse counts).

- Initial Pressure Position (home position) -- Pressure Level No.5

The machine looks for the initial pressure position each time the main power is turned ON or All Reset button is pressed.
In this case, the Pressure control motor operates depending on the condition of the Pressure control sensor, as described below.

- **If the light path of the Pressure control sensor is open ;**
  The Pressure control motor rotates until the light path is blocked by the Bracket B, then rotates in the reverse direction until the light path is opened again.
- **If the light path of the pressure control sensor is blocked by the Bracket B;**
  The Pressure control motor rotates until the light path of the sensor is opened.

The initial (home) pressure position of the printing pressure is Level No.5.
Once the initial pressure position is achieved, the Pressure control motor rotates until the pressure level is adjusted to the equivalent of Print speed No.1. The printing starts from the low speed and is increased, changing the pressure at the same time, until a selected speed is achieved.

- At Speed-change Mode

When the Print speed button on the operation panel is pressed to change the printing speed, the pressure is increased as the speed is increased to keep the print density constant.

[Note] If the Print speed button is pressed while the machine is in idle, the Pressure control motor does not rotate until printing starts.

- At Density-change Mode (Not available for GR1700)

When the Print density button on the operation panel is pressed to change the print density, the pressure is increased as the density is increased.

[Note] If the Print density button is pressed while the machine is in idle, the Pressure control motor does not rotate until printing starts.

[For GR3750 ~ The Print speed is set at "3" for the Density-change mode with the BLACK Drum installed.]

In-drum Temperature \ Print Speed (Density) Setting			First Print (0 to 1 hour)	1	2	3	4	5
~10.0°C	(~50°F)	<~AB>	Level 10	Level 9	Level 10	Level 10	Level 10	Level 10
10.0~15.0°C	(50~59°F)	<AA~9C>	Level 9	Level 7	Level 9	Level 10	Level 10	Level 10
15.0~20.0°C	(59~68°F)	<9B~8D>	Level 6	Level 5	Level 7	Level 8	Level 9	Level 10
20.0~25.0°C	(68~77°F)	<8C~7E>	Level 3	Level 3	Level 5	Level 7	Level 8	Level 9
25.0~30.0°C	(77~86°F)	<7D~6F>	Level 3	Level 2	Level 4	Level 6	Level 7	Level 8
30.0°C~	(86°F~)	<6E~>	Level 2	Level 2	Level 3	Level 4	Level 5	Level 6

* "Level 1" corresponds to the lowest print pressure and "Level 10" the highest.
* The hexadecimal number in "< >" indicates a digital display of temperature in the drum which is displayed on the operation panel in Test mode No.115.

4. Pressure Regulation System <GR>

[Printing Pressure Setting Chart For GR3750]

In-drum Temperature	Speed-change Mode / Density-change Mode / For First Print (Period from the previous use)												
	- Speed 1	Density 1	Density 2	Speed 1	Speed 2	Speed 3	Speed 4	Speed 5					
	- Speed 2		Density 1	Density 3	Density 4	Density 5							
	- Speed 3			Density 2	Density 3	Density 4	Density 5						
	- Speed 4			Density 1	Density 2	Density 3	Density 4	Density 5					
	- Speed 5				Density 1	Density 2	Density 3	Density 4	Density 5				
						Density 1	Density 2	Density 3	Density 4	Density 5			
	0 ~ 1 HR	1 ~ 3 HR	Over 3 HR	Auto Idle									
~10.0°C (~50°F)	Level 10 < 10 >	Level 10 < 10 >	Level 10 < 10 >	Level 10 < 10 >	Level 7 < 7 >	Level 8 < 8 >	Level 9 < 9 >	Level 10 < 10 >	Level 10 < 10 >	Level 10 < 10 >	Level 10 < 10 >	Level 10 < 10 >	Level 10 < 10 >
10.0~15.0°C (50~59°F)	Level 9 < 9 >	Level 10 < 10 >	Level 10 < 10 >	Level 9 < 9 >	Level 5 < 5 >	Level 6 < 6 >	Level 7 < 7 >	Level 9 < 9 >	Level 10 < 10 >	Level 10 < 10 >	Level 10 < 10 >	Level 10 < 10 >	Level 10 < 10 >
15.0~20.0°C (59~68°F)	Level 6 < 6 >	Level 8 < 8 >	Level 9 < 9 >	Level 7 < 7 >	Level 3 < 4 >	Level 4 < 5 >	Level 5 < 6 >	Level 6 < 8 >	Level 7 < 9 >	Level 9 < 10 >	Level 10 < 10 >	Level 10 < 10 >	Level 10 < 10 >
20.0~25.0°C (68~77°F)	Level 3 < 3 >	Level 5 < 5 >	Level 8 < 8 >	Level 5 < 5 >	Level 1 < 2 >	Level 2 < 3 >	Level 3 < 4 >	Level 5 < 6 >	Level 7 < 8 >	Level 8 < 9 >	Level 9 < 10 >	Level 10 < 10 >	Level 10 < 10 >
25.0~30.0°C (77~86°F)	Level 3 < 3 >	Level 4 < 4 >	Level 7 < 7 >	Level 4 < 4 >	Level 1 < 1 >	Level 1 < 2 >	Level 2 < 3 >	Level 4 < 5 >	Level 6 < 7 >	Level 7 < 8 >	Level 8 < 9 >	Level 9 < 10 >	Level 10 < 10 >
30.0°C~ (86°F~)	Level 2 < 2 >	Level 4 < 4 >	Level 6 < 6 >	Level 3 < 3 >	Level 1 < 1 >	Level 1 < 2 >	Level 2 < 3 >	Level 3 < 4 >	Level 4 < 5 >	Level 5 < 6 >	Level 6 < 7 >	Level 7 < 8 >	Level 8 < 9 >

* The numbers in the brackets < > in the chart above indicate the print pressure settings when a color drum is installed.

[Printing Pressure Setting Chart For GR2750 & GR1750]

In-drum Temperature	Speed-change Mode / Density-change Mode / For First Print (Period from the previous use)												
	- Speed 1	Density 1	Density 2	Speed 1	Speed 2	Speed 3	Speed 4	Speed 5					
	- Speed 2		Density 1	Density 3	Density 4	Density 5							
	- Speed 3			Density 2	Density 3	Density 4	Density 5						
	- Speed 4			Density 1	Density 2	Density 3	Density 4	Density 5					
	- Speed 5				Density 1	Density 2	Density 3	Density 4	Density 5				
						Density 1	Density 2	Density 3	Density 4	Density 5			
	0 ~ 1 HR	1 ~ 3 HR	Over 3 HR	Auto Idle									
~10.0°C (~50°F)	Level 10 < 10 >	Level 10 < 10 >	Level 10 < 10 >	Level 10 < 10 >	Level 7 < 8 >	Level 8 < 9 >	Level 9 < 10 >	Level 10 < 10 >	Level 10 < 10 >	Level 10 < 10 >	Level 10 < 10 >	Level 10 < 10 >	Level 10 < 10 >
10.0~15.0°C (50~59°F)	Level 10 < 10 >	Level 10 < 10 >	Level 10 < 10 >	Level 10 < 10 >	Level 5 < 6 >	Level 6 < 7 >	Level 7 < 8 >	Level 8 < 9 >	Level 10 < 10 >	Level 10 < 10 >	Level 10 < 10 >	Level 10 < 10 >	Level 10 < 10 >
15.0~20.0°C (59~68°F)	Level 8 < 8 >	Level 8 < 8 >	Level 10 < 10 >	Level 8 < 8 >	Level 3 < 4 >	Level 4 < 5 >	Level 5 < 6 >	Level 6 < 7 >	Level 8 < 9 >	Level 10 < 10 >	Level 10 < 10 >	Level 10 < 10 >	Level 10 < 10 >
20.0~25.0°C (68~77°F)	Level 5 < 5 >	Level 6 < 6 >	Level 9 < 9 >	Level 4 < 4 >	Level 1 < 2 >	Level 2 < 3 >	Level 3 < 4 >	Level 5 < 6 >	Level 7 < 8 >	Level 9 < 9 >	Level 10 < 10 >	Level 10 < 10 >	Level 10 < 10 >
25.0~30.0°C (77~86°F)	Level 4 < 4 >	Level 5 < 6 >	Level 8 < 9 >	Level 4 < 4 >	Level 1 < 2 >	Level 1 < 3 >	Level 2 < 4 >	Level 4 < 5 >	Level 6 < 7 >	Level 8 < 9 >	Level 9 < 10 >	Level 10 < 10 >	Level 10 < 10 >
30.0°C~ (86°F~)	Level 3 < 4 >	Level 5 < 6 >	Level 7 < 8 >	Level 5 < 5 >	Level 1 < 1 >	Level 1 < 1 >	Level 2 < 2 >	Level 3 < 3 >	Level 5 < 5 >	Level 7 < 7 >	Level 8 < 8 >	Level 9 < 9 >	Level 10 < 10 >

* The numbers in the brackets < > in the chart above indicate the print pressure settings when a color drum is installed.

[Printing Pressure Setting Chart For GR1700]

In-drum Temperature	For First Print (Period from the previous use)				Speed-change Mode	Speed 1	Speed 2	Speed 3	Speed 4	Speed 5
	0 ~ 1 HR	1 ~ 3 HR	Over 3 HR	Auto Idle						
~10.0°C (~50°F)	Level 10 < 10 >	Level 10 < 10 >	Level 10 < 10 >	Level 10 < 10 >		Level 10 < 10 >	Level 10 < 10 >	Level 10 < 10 >	Level 10 < 10 >	Level 10 < 10 >
10.0~15.0°C (50~59°F)	Level 10 < 10 >	Level 10 < 10 >	Level 10 < 10 >	Level 10 < 10 >		Level 9 < 9 >	Level 9 < 9 >	Level 10 < 10 >	Level 10 < 10 >	Level 10 < 10 >
15.0~20.0°C (59~68°F)	Level 9 < 9 >	Level 9 < 9 >	Level 10 < 10 >	Level 9 < 9 >		Level 6 < 7 >	Level 7 < 8 >	Level 8 < 9 >	Level 9 < 10 >	Level 10 < 10 >
20.0~25.0°C (68~77°F)	Level 6 < 7 >	Level 7 < 8 >	Level 9 < 9 >	Level 6 < 7 >		Level 4 < 6 >	Level 5 < 7 >	Level 7 < 8 >	Level 8 < 9 >	Level 9 < 10 >
25.0~30.0°C (77~86°F)	Level 5 < 5 >	Level 6 < 7 >	Level 9 < 9 >	Level 5 < 6 >		Level 2 < 4 >	Level 3 < 5 >	Level 6 < 6 >	Level 7 < 7 >	Level 8 < 8 >
30.0°C~ (86°F~)	Level 2 < 3 >	Level 4 < 5 >	Level 7 < 8 >	Level 5 < 6 >		Level 1 < 3 >	Level 2 < 4 >	Level 4 < 5 >	Level 6 < 6 >	Level 7 < 7 >

* The numbers in the brackets < > in the chart to the left indicate the print pressure settings when a color drum is installed.